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## NOTICE OF ALLOWANCE AND FEE(S) DUE

22801 7590 09/21/2009

LEE & HAYES, PLLC  
601 W. RIVERSIDE AVENUE  
SUITE 1400  
SPOKANE, WA 99201

EXAMINER

SYED, FARHAN M

ART UNIT

PAPER NUMBER

2165

DATE MAILED: 09/21/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/783,343

02/20/2004

David Wortendyke

MS1-1825US

7693

TITLE OF INVENTION: SYSTEMS AND METHODS FOR PARALLEL EVALUATION OF MULTIPLE QUERIES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	12/21/2009

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

### HOW TO REPLY TO THIS NOTICE:

#### I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

# **PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
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**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

22801 7590 09/21/2009

LEE & HAYES, PLLC  
601 W. RIVERSIDE AVENUE  
SUITE 1400  
SPOKANE, WA 99201

## **Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/783,343 02/20/2004 David Wortendyke MS1-1825US 7693

TITLE OF INVENTION: SYSTEMS AND METHODS FOR PARALLEL EVALUATION OF MULTIPLE QUERIES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	12/21/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
SYED, FARHAN M	2165	707-002000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 \_\_\_\_\_
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_
- 3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s); (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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10/783,343	02/20/2004	David Wortendyke	MS1-1825US	7693
22801	7590	09/21/2009	EXAMINER	
LEE & HAYES, PLLC 601 W. RIVERSIDE AVENUE SUITE 1400 SPOKANE, WA 99201			SYED, FARHAN M	
			ART UNIT	PAPER NUMBER
			2165	
DATE MAILED: 09/21/2009				

## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 306 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 306 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/783,343	WORTENDYKE ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	FARHAN M. SYED	2165	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 6/4/09.
2. ☒ The allowed claim(s) is/are 1-3,5,6,15-22,24-26 and 28-38.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some\*    c) ☐ None    of the:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).  
\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.  
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached  
1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.  
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |  |
|--|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 5. <input type="checkbox"/> Notice of Informal Patent Application                      |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 6. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____    | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment                    |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance   |
|  | 9. <input type="checkbox"/> Other _____.   |

/F. M. S./  
Examiner, Art Unit 2165

/Neveen Abel-Jalil/  
Supervisory Patent Examiner, Art Unit 2165

### **DETAILED ACTION**

1. Applicant's amendments and arguments filed on 04 June 2009 have been fully considered and they are deemed to be persuasive.

### **EXAMINER'S AMENDMENT**

2. Authorization for Examiner's Amendment to the amendment filed 04 June 2009 was given by Mr. Trevor Lind (Reg. No. 54,785) in a telephone interview on 04 September 2009. The applicant agreed to cancel claims 4, 7-14, 23, and 27.
3. An examiner's amendment to the amendment filed 04 June 2009 appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.
4. The application has been amended as follows:
  1. (Currently Amended) A method comprising:
    - receiving an input, by a computer system executing an inverse query engine, wherein the input comprises a plurality of characters;
    - grouping, by the computer system, the plurality of characters into one or more elemental language units;

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breaking, by the computer system, the one or more elemental language units into one or more constituent parts;

generating, by the computer system, opcodes from the one or more elemental language units and from the one or more constituent parts, wherein the language units have been parsed and compiled into opcodes;

merging, by the computer system, the opcodes into an opcode tree comprising opcode nodes and branch nodes, wherein there are no opcodes added to the opcode tree during an active merging;

evaluating, by the computer system, the input against multiple queries, wherein multiple queries comprising Xpath queries, by evaluating common query expressions of the multiple queries in parallel, at the same time, wherein the opcodes common to one or more queries are executed only once;

traversing, by the computer system, the opcode tree of hierarchical nature that includes a plurality of opcode nodes which together define opcodes that should be executed to evaluate a plurality of queries, and wherein a tree segment in a shared path represents an opcode block prefix that is common to two or more queries;

identifying, by the computer system, a branch node including a number of branches, wherein a literal comparison is performed for each branch;

applying, by the computer system, an optimization algorithm when the number of branches of the branch node is above a specified number, wherein the optimization algorithm combines the literal comparisons of each of the branches into an indexed literal branch opcode object;

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executing, by the computer system, each of the opcode nodes in the opcode tree as each opcode node is encountered in the traversal to evaluate the plurality of queries against the input;

indexing, by the computer, branch opcodes to provide a framework for insertion of indexing techniques that are customized to a type of comparison;

maintaining, by the computer system, an opcode tree copy that is used during query processing by the opcode tree, wherein operations may be undertaken on the opcode tree without interfering with the query processing;

updating, by the computer system, the opcode tree, wherein the opcode nodes are merged into or removed from the opcode tree while the opcode tree copy is used for query processing;

wherein a relationship between the opcodes and the opcode tree is embedded in the opcodes that are created when a query is compiled;

determining, by the computer system, that the number of branches of the branch node is below the specified number; and

modifying, by the computer system, the indexed literal branch opcode object into a generic branch opcode object.

4. (Cancelled).

7-14 (Cancelled).

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15. (Currently Amended). A query evaluation system, comprising:

a memory;

a processor coupled to the memory for executing a parallel evaluation of multiple queries;

a language analysis module generating input into opcodes, wherein an input comprises one or more elemental language units, and wherein the language analysis module parses and compiles the one or more elemental language units inputted;

an opcode merger configured to:

combine opcodes that are derived from compiling expressions into an opcode tree comprising opcode nodes, wherein the opcode merger detects using an optimization algorithm to implement an optimization technique that includes combining literal comparisons into an indexed literal branch opcode object, wherein there are no opcodes added to the opcode tree during an active merging;

determining that the optimization technique is to be removed; and modify the indexed literal branch opcode object into a generic branch opcode object in response to determining that the optimization technique is to be removed;

a query processor for evaluating an input against multiple queries, comprising of Xpath queries, wherein an evaluation is performed by traversing and executing each node of an opcode tree;

the opcode tree of hierarchical nature stored in memory and containing opcode nodes that include opcode objects corresponding to a plurality of queries, each opcode object that is common to multiple queries being represented by a single opcode node;



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the opcode tree that is used during processing by the query processor is copied and updated, wherein the opcode nodes are removed from the opcode tree while the opcode tree copy is used for query processing;

wherein a relationship between the opcodes and the opcode tree is embedded in the opcodes that are created when a query is compiled.

23. (Cancelled).

24. (Currently Amended) One or more computer-readable storage media containing computer-executable instructions that, when executed by a computer, perform the following steps:

evaluating input against multiple queries, wherein multiple queries comprising of Xpath queries, by evaluating common query expressions of the multiple queries in parallel at a same time, wherein the common query expressions are executed only once;

generating an input of elemental language units into opcodes;

merging opcodes into an opcode tree of hierarchical nature comprising opcode nodes and branch nodes, wherein the language units have been parsed and compiled into opcodes, wherein there are no opcodes added to the opcode tree during an active merging;

traversing the opcode tree that includes a plurality of opcode nodes which together define opcodes that should be executed to evaluate a plurality of queries, and

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wherein a tree segment in a shared path represents an opcode block prefix that is common to two or more queries;

executing opcode nodes as encountered in the opcode tree to evaluate a plurality of queries, represented in the opcode tree, at least one opcode node corresponding to at least a portion of two or more of the plurality of queries;

indexing branch opcodes to provide a framework for insertion of indexing techniques that are customized to a type of comparison;

caching an execution context derived from the execution of a first segment of opcode nodes;

re-using the execution context when executing a second opcode node;

maintaining the opcode tree that is used during processing by making a copy of the opcode tree;

updating the opcode tree, wherein the opcode nodes are removed from the opcode tree while the opcode tree copy is used for query processing;

wherein a relationship between the opcodes and the opcode tree is embedded in the opcodes that are created when a query is compiled;

receiving a request to remove a particular query;

traversing the opcode tree to identify tree segments that are common between the particular query and at least one other query in the opcode tree;

identifying a branch of the opcode tree that is specific to the particular query; and

removing the branch that is specific to the particular query.

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27. (Cancelled).

***Allowable Subject Matter***

5. Claims 1-3, 5-6, 15-22, 24-26, and 28-38 are allowed over the prior art of record.

***Reasons For Allowance***

6. The following is an examiner's statement of reasons for allowance:

Regarding independent claims 1, 15, and 24, Applicants particular method and associated systems of evaluating, by the computer system, the input against multiple queries, wherein multiple queries comprising Xpath queries, by evaluating common query expressions of the multiple queries in parallel, at the same time, wherein the opcodes common to one or more queries are executed only once; updating, by the computer system, the opcode tree, wherein the opcode nodes are merged into or removed from the opcode tree while the opcode tree copy is used for query processing; wherein a relationship between the opcodes and the opcode tree is embedded in the opcodes that are created when a query is compiled; determining, by the computer system, that the number of branches of the branch node is below the specified number; and modifying, by the computer system, the indexed literal branch opcode object into a generic branch opcode object, was not disclosed by, would not have been obvious over, nor would have been fairly suggested by the prior art of record.

The dependent claims, being further limiting to the independent claims, definite and enabled by the specification are also allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Farhan M. Syed whose telephone number is 571-272-7191. The examiner can normally be reached on 8:30AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Neveen Abel-Jalil can be reached on 571-272-4074. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/F. M. S./

Application/Control Number: 10/783,343

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Examiner, Art Unit 2165

/Neveen Abel-Jalil/

Supervisory Patent Examiner, Art Unit 2165